



UNIVERSITI TEKNOLOGI MARA

**REMOVAL OF CADMIUM AND
CHROMIUM HEXA VALENT IN
INDUSTRIAL EFFLUENT BY
BACILLUS SPP. AND
*STAPHYLOCOCCUS SPP.***

NURULAIN BINTI MAHADI

**Project submitted in fulfillment of the requirements
for degree of**

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Declaration by Student

Project entitled 'Removal of Cadmium and Chromium Hexavalent in Industrial Effluent by *Bacillus spp.* and *Staphylococcus spp.*' is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due to reference to the literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Madam Shantakumari Rajan as project supervisor. It has been submitted to the Faculty of Health Sciences in partial fulfilment of the requirement for the Bachelor in Environmental Health and Safety (Hons.).

Student's Signature

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(Nurulain binti Mahadi)

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ABSTRACT

Environmental pollution nowadays becomes a concerned issue by the people as they are more appreciating a good quality of environment to maintain their health and performance. One of the sources of environmental pollutant is from the untreated industrial effluent that discharged into open water bodies. Heavy metals in the effluents such Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Iron (Fe), and others can harm the environment, animals, plants, aquatic life, and even human beings. Industrial effluent that contained high heavy metals concentration must undergo treatment before permitted to be discharged to the environment. The cost-effective, environmental friendly and reliable method to reduce heavy metals contained in the industrial effluent is by biological treatment specifically by using bacteria. This study was done to identify the efficacy of bacterial activation of different bacteria species in different bacterial concentration to reduce the concentration of Cadmium (Cd) and Chromium Hexavalent (Cr (VI)] in industrial effluent. The samples were taken monthly in three months period from a steel pipe manufacturer which assumed to have industrial effluent contained with heavy metals. The samples were analysed on the physic-chemical characteristics including temperature (°C), pH, Biochemical Oxygen Demand (BOD), and Chemical Oxygen Demand (COD). The samples were treated with two different bacteria; *Bacillus spp.* and *Staphylococcus spp.* with different bacterial concentration (10^{-1} to 10^{-5}) to study the most efficient condition for heavy metals treatment. The results shows that there is no significant of treating Cd by both bacteria however, the most efficient treatment for Cr (VI) was by 10^{-1} *Bacillus spp.* which achieving reduction to 0.239 mg/L (73.2%) of reduction from the mean concentration of initial Cr (VI) concentration of 0.814 mg/L. Cr (VI) is easier to be treated as the characteristic smaller ionic radius cause them to metabolite more in the bacterial cells. Every industry must comply with the gazetted regulations on the effluent discharges to help in sustaining the quality of our environment. Biological treatment is another reliable alternative in treating industrial effluents which guarantee the simple procedures are worth with the efficacy of the treatment.

Keywords: Industrial Effluent, Cadmium, Chromium Hexavalent, *Bacillus spp.*, *Staphylococcus spp.*, Biological Treatment